

TCEQ Emissions Inventory (EI) & EPA Toxics Release Inventory (TRI)

Report by Pasadena CAC Plants *2022 Data and Trends* *Short Presentation* FINAL 12-03-2023

CELINA O'CONNOR

CHEVRON PASADENA REFINERY

NOVEMBER 28, 2023

Parts of the Emissions Report

Orientation Packet: Background information on why the CAC presents emissions reports and of air pollution and how the data is collected.

Spreadsheet Handout: List of plants and what they make or do. TCEQ Emissions Inventory (EI) section and EPA Toxics Release Inventory section with a worksheet for each covered pollutant. Each pollutant worksheet shows trends and has plant-specific data for 2018-2022, totals, percentage change over 5 years, significant reasons for change. Color-coded to show significant increases and decreases in pounds and percentages. Plants exempt from reporting inventories are indicated.

Highlights Page: Lists pollutants covered in the spreadsheets, pounds released in 2022 and the percentage they changed from 2021 to 2022 (**red** = increase, **green** = decrease). Lists the number of plants reporting each inventory.

“Full” Presentation: Contains all the information in the format that has been used in our traditional face-to-face meetings, including main reasons for increases and decreases.

1-Year Change in PCAC Plant Releases 2021-2022

- **10% decrease** in total TCEQ Air Emissions Inventory (EI) releases to air
- **7% decrease** in total EPA Toxics Release Inventory (TRI) releases to air
 - Some plants will show increases and others decreases, but overall, emissions were down in 2022, except for NOx.
 - Still seeing effects of 2021's Winter Storm Uri. Some plants that had reductions in 2021 because of shutdowns show increases this year as they return to normal operation. Plants that had added emissions from upsets and startups during the storm may not have had them in 2022.
 - Chevron's Pasadena Refinery showed the greatest emissions reductions in 2022 because of reduced FCC operating hours and reduced flaring.

TCEQ Air Emissions Inventory (EI) Trends in PCAC Plants

Change in PCAC Plants TCEQ Air Emissions Inventory

	2018-2022	2021-2022
Total PCAC Air Emission Inventory (EI)	- 32%	- 11%
Nitrogen Oxides (NOx)	- 22%	+ 3%
Volatile Organic Compounds (VOCs)	- 21%	- 9%
Highly Reactive VOCs (HRVOCs)	- 15%	- 6%
Carbon Monoxide (CO)	+ 17%	- 4%
Total Suspended Particulates (TSP)	- 29%	- 6%
Particulate Matter (PM 2.5)	- 24%	- 7%
Sulfur Oxides (SOx)	- 76%	- 43%
Routine Permitted Emissions	- 29%	- 9%
Maintenance Emissions	+ 299%	- 52%
Upset Emissions	- 86%	- 53%

Pounds of TCEQ EI per Million Pounds of Product for PCAC Plants

1995, 2005, 2010, 2018-2022

Pounds

1200

1000

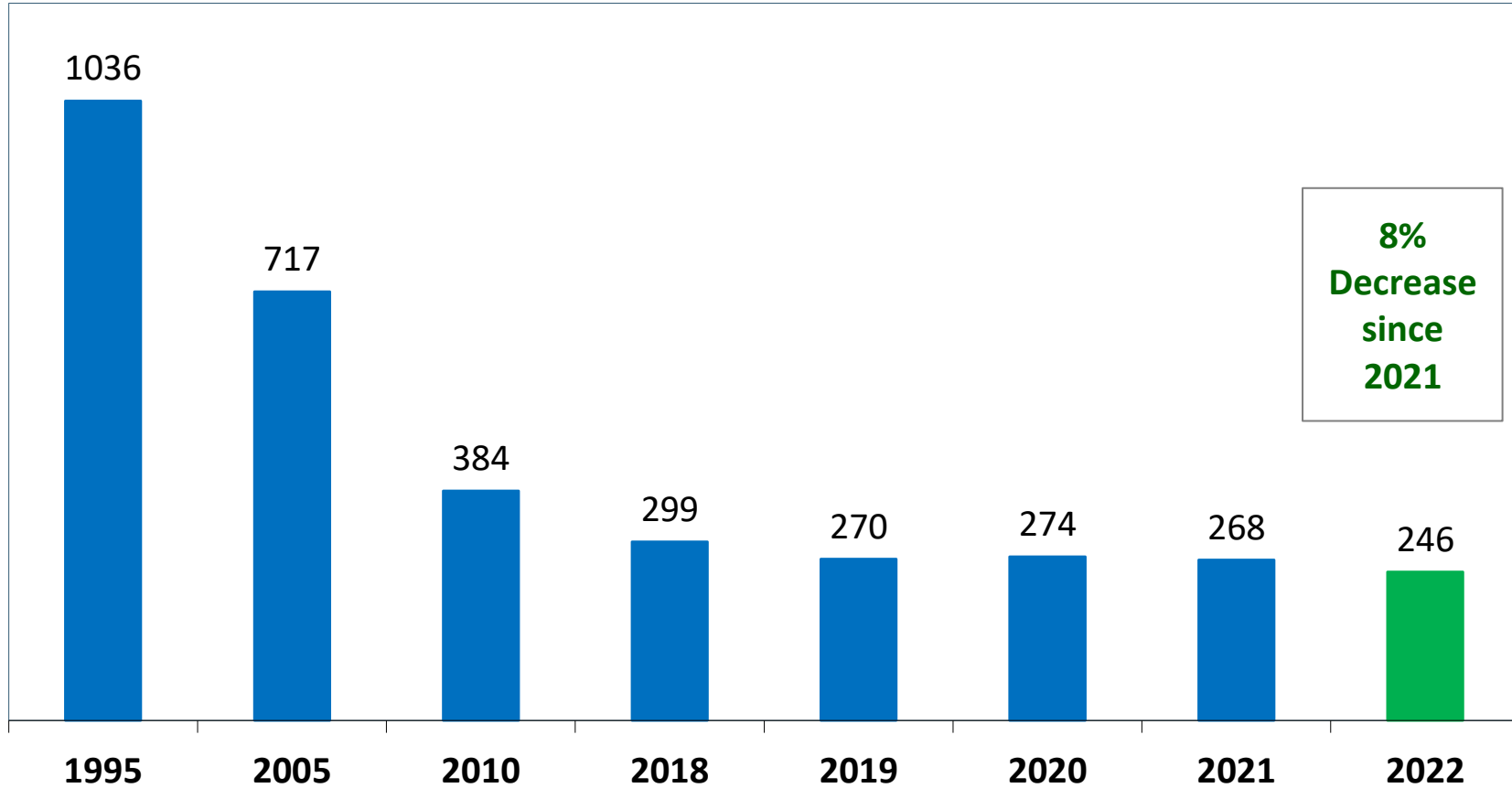
800

600

400

200

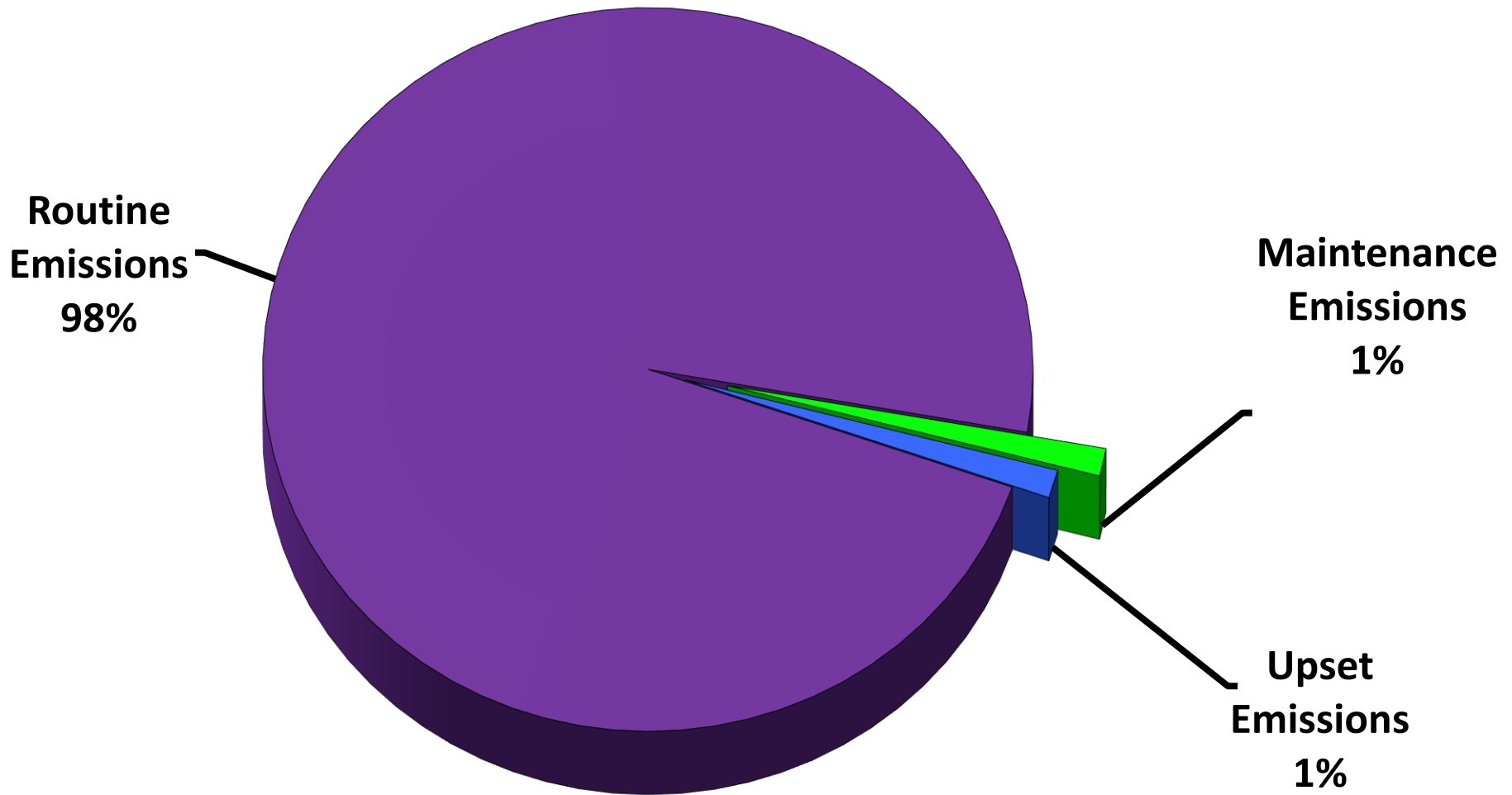
0



1995→2022 : 76% Reduction in EI Emissions per Million Pounds of Product

Since 1995, PCAC plants have produced 46-57 billion pounds of product each year.

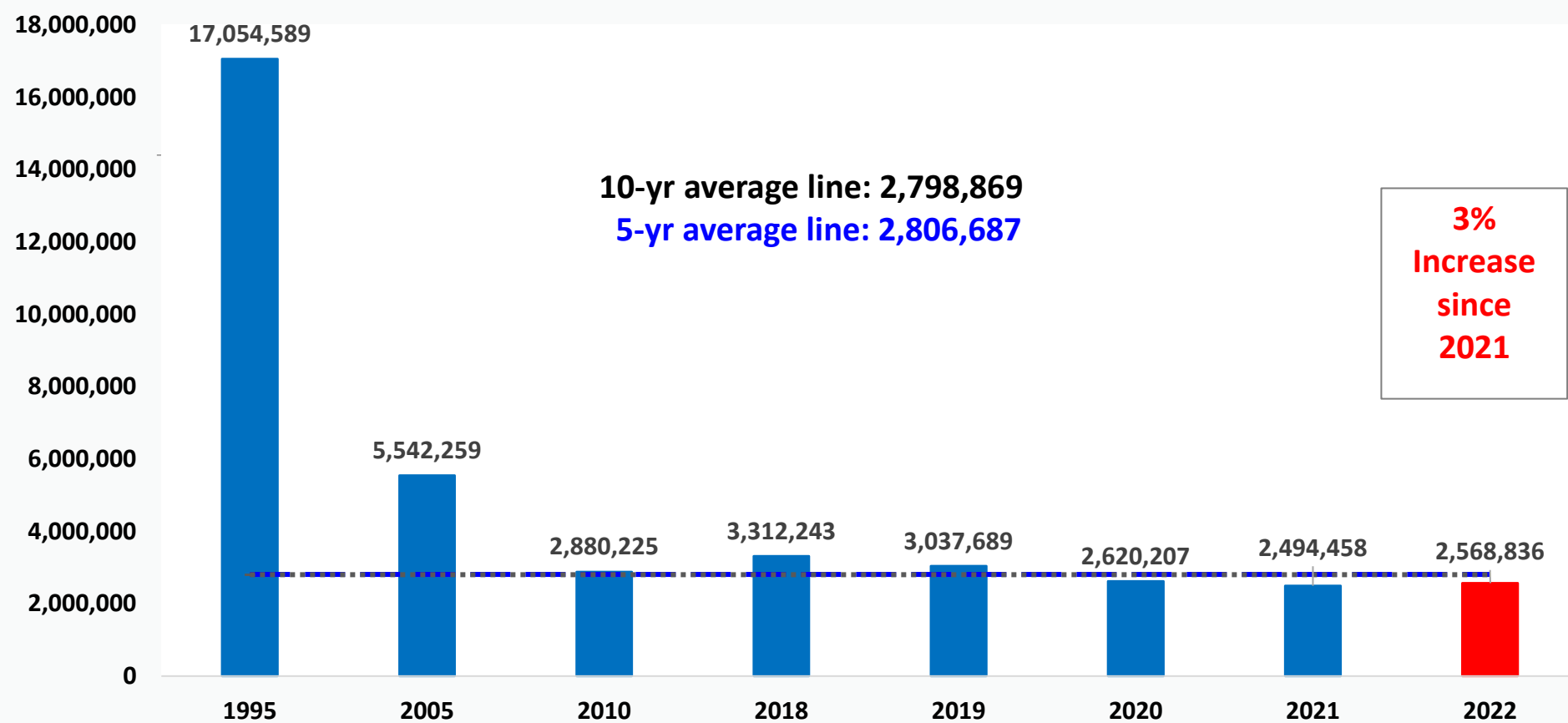
2022 TCEQ EI Emissions by Cause



Nitrogen Oxides (NOx)

1995, 2005, 2010, 2018-2022 TCEQ Air Emissions Inventory

Black dots = 10 year average. Blue dashes = 5 year average.



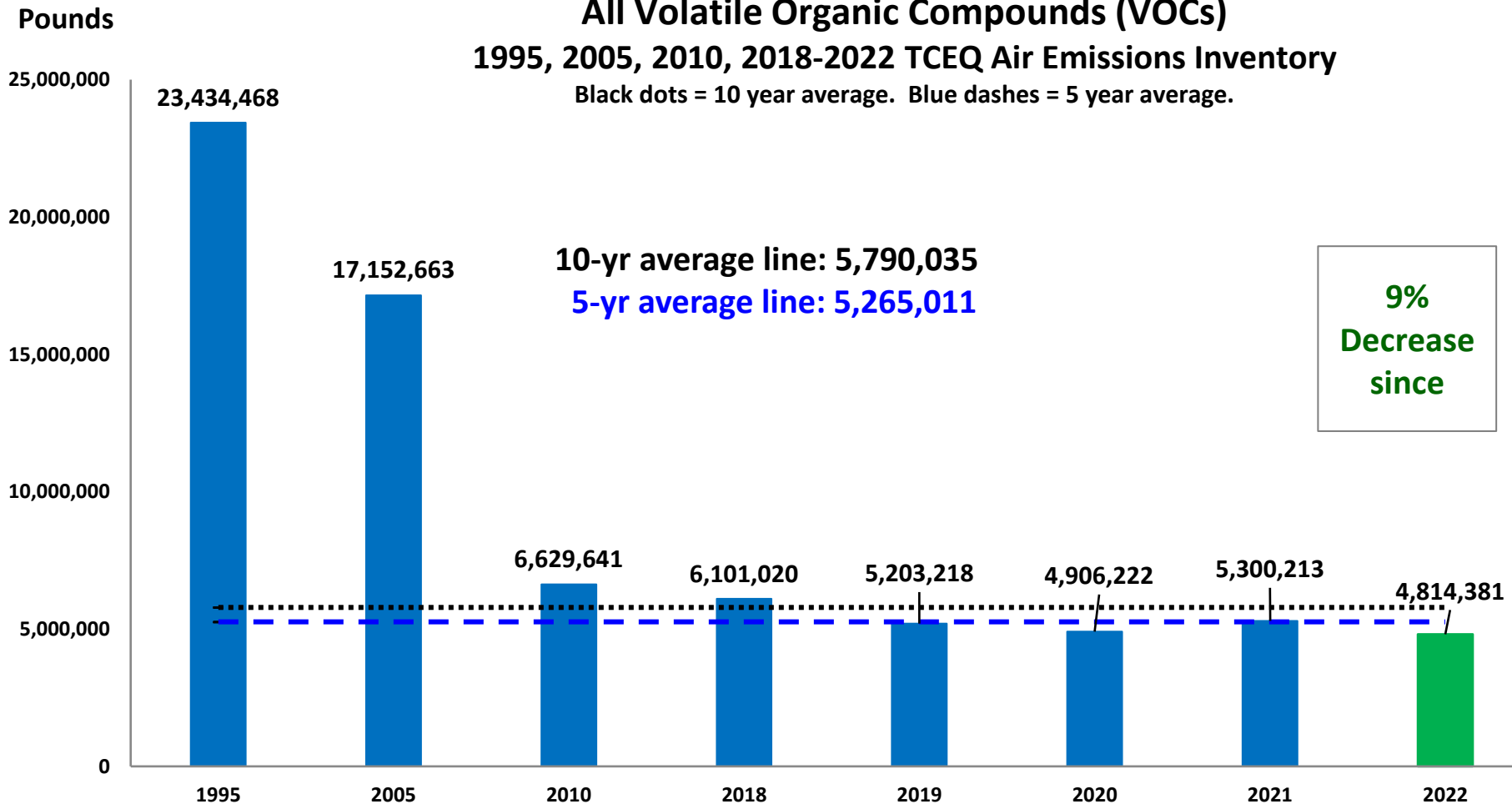
1995→2022: 85% Reduction in NOx Emissions

Biggest change since 2021 was increase at LyondellBasell Refinery:
Higher refinery rates & flaring due to incidents & maintenance at their 3rd Party gas takers.

All Volatile Organic Compounds (VOCs)

1995, 2005, 2010, 2018-2022 TCEQ Air Emissions Inventory

Black dots = 10 year average. Blue dashes = 5 year average.



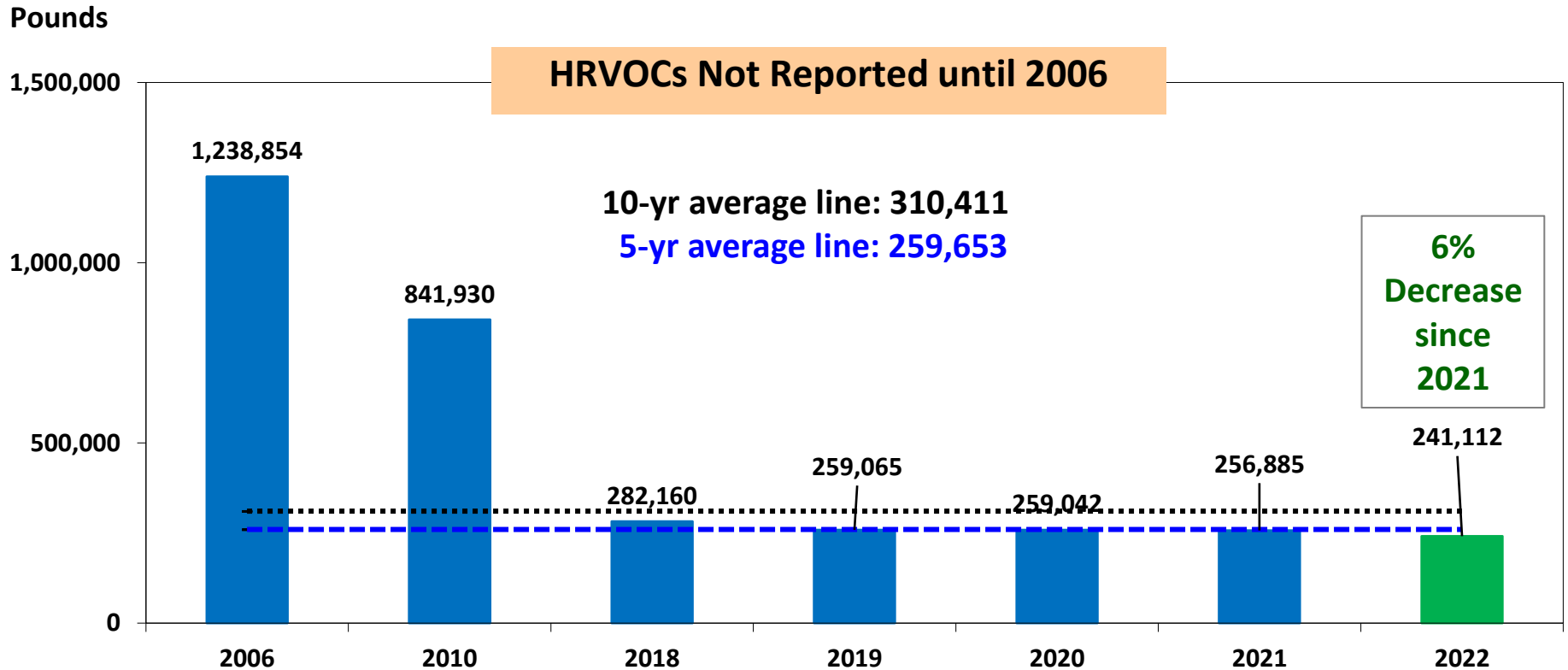
1995→2022 : 79% Reduction in All VOC Emissions

Biggest change since 2021 was decrease at Chevron Phillips:

Sustainable: Due to accounting for carbon control device and physically monitoring VOC Leak Detection and Repair (LDAR) connectors instead of not monitoring and assuming leak rates based on agency factors.

Highly Reactive Volatile Organic Compounds (HRVOCs) (subset of VOCs)

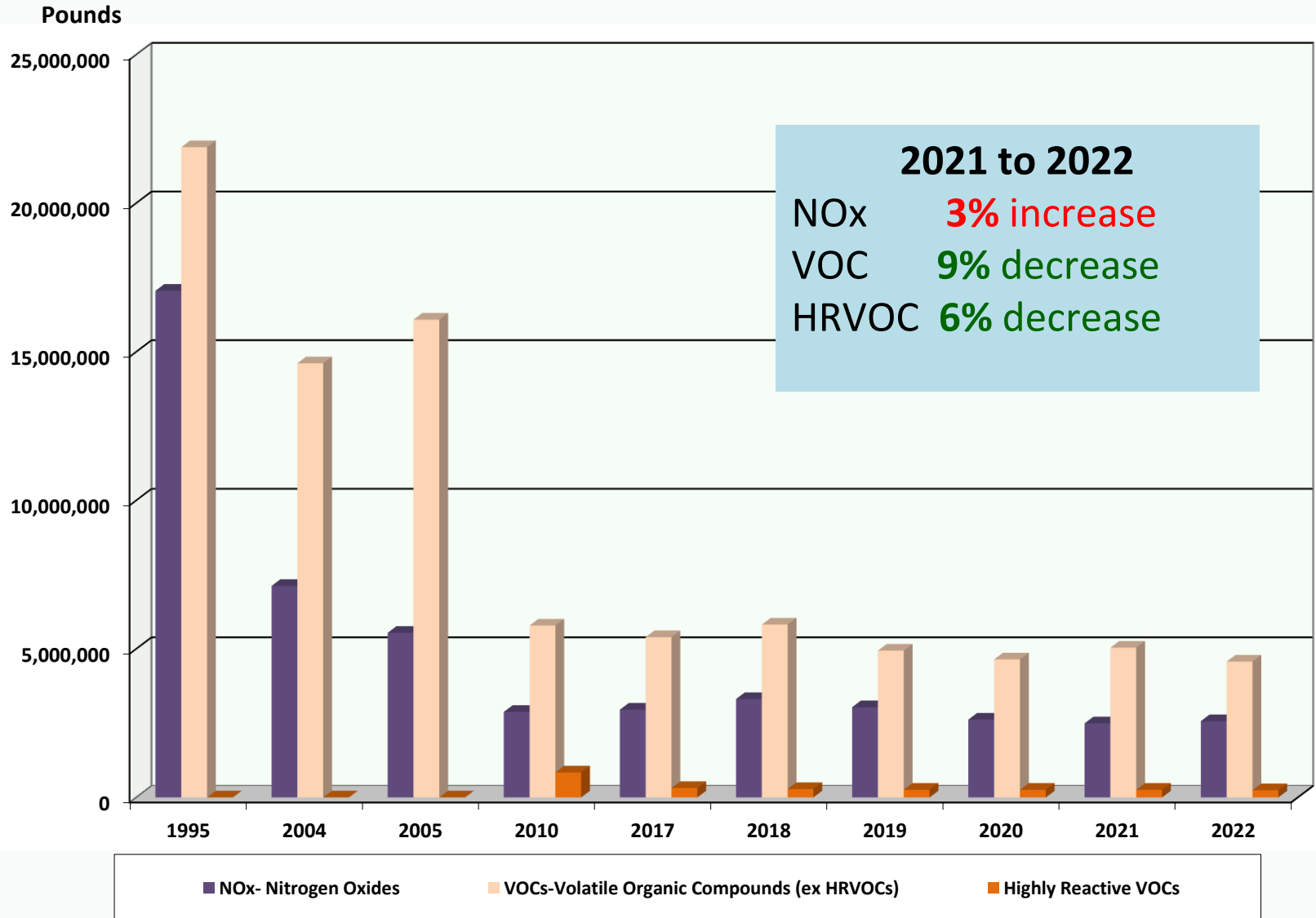
2006, 2010, 2018-2022 TCEQ Air Emissions Inventory
Black dots = 10 year average. Blue dashes = 5 year average.



2006→2022: 81% Reduction in HRVOC Emissions

Biggest change since 2021 was decrease at Chevron Pasadena Refinery:
Sustainable: Decrease primarily from reduced FCC and Alky operating hours/rates.

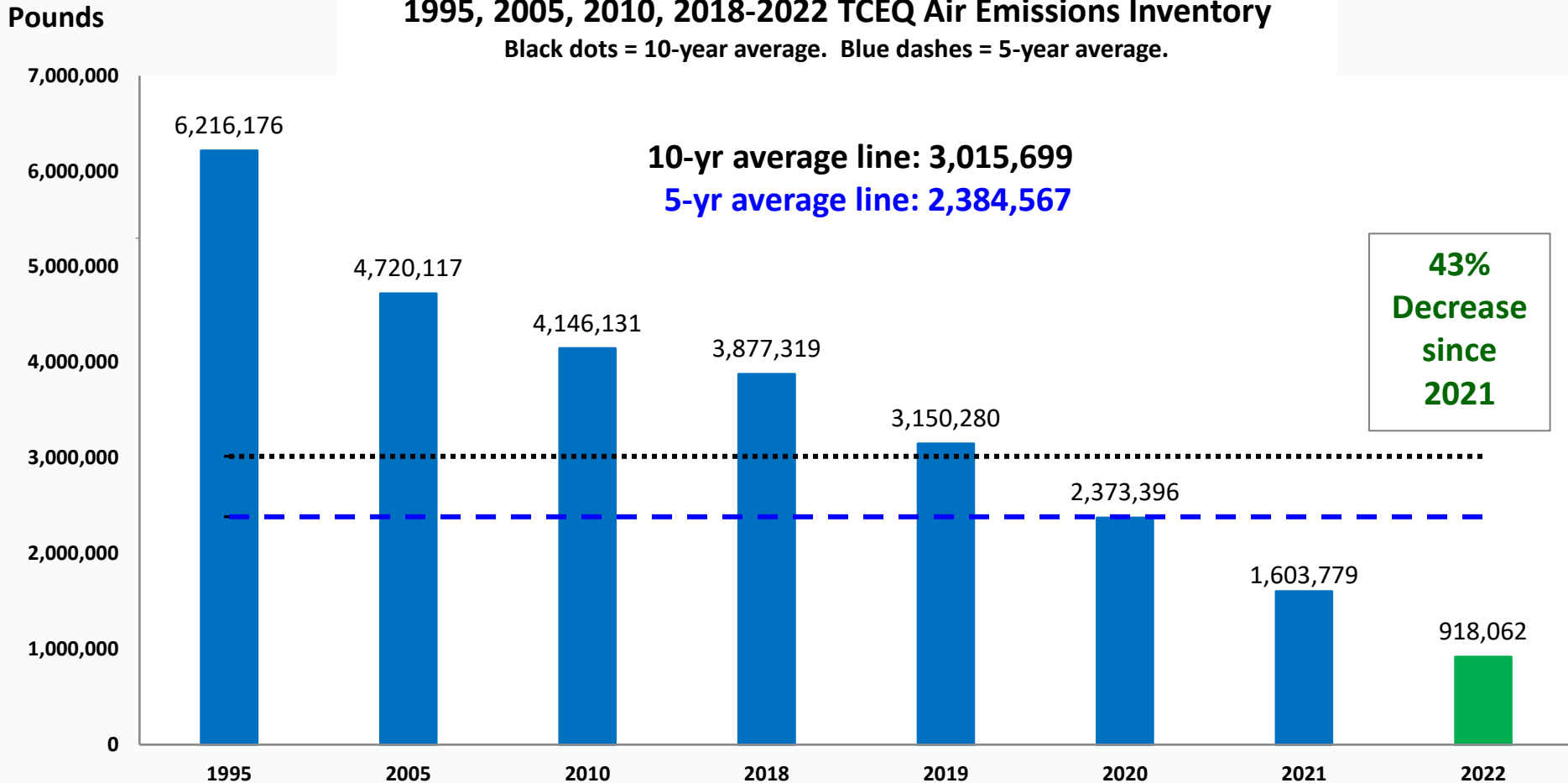
Ozone Formation NOx, VOCs (excluding HRVOCs) & HRVOCs 1995, 2005, 2010, 2018-2022



Sulfur Oxides (SOx)

1995, 2005, 2010, 2018-2022 TCEQ Air Emissions Inventory

Black dots = 10-year average. Blue dashes = 5-year average.



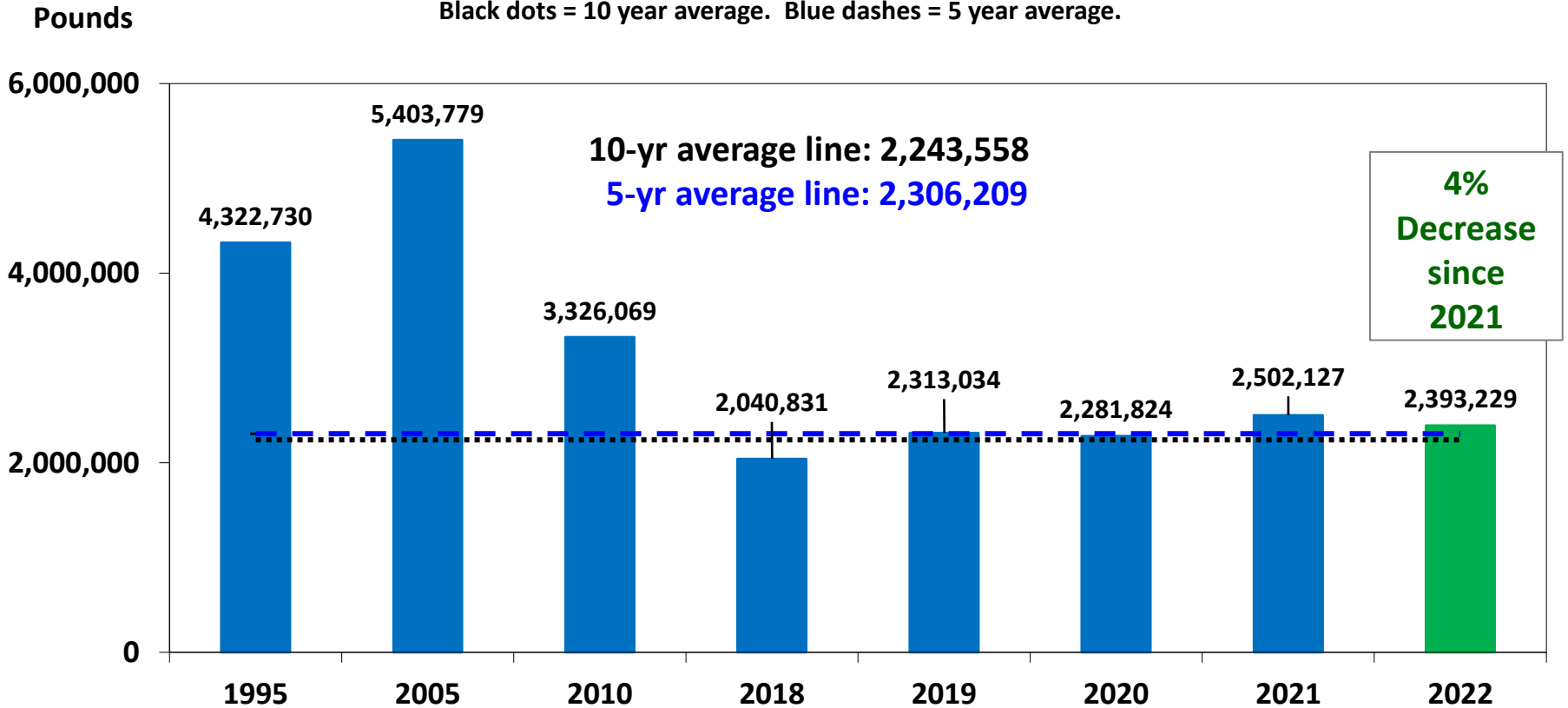
1995→2022: 85% Reduction in SOx Emissions

Biggest change since 2021 was decrease at Chevron Pasadena Refinery:
Sustainable: Decrease primarily from reduced FCC operating hours/rates.

Carbon Monoxide (CO)

1995, 2005, 2010, 2018-2022 TCEQ Air Emissions Inventory

Black dots = 10 year average. Blue dashes = 5 year average.



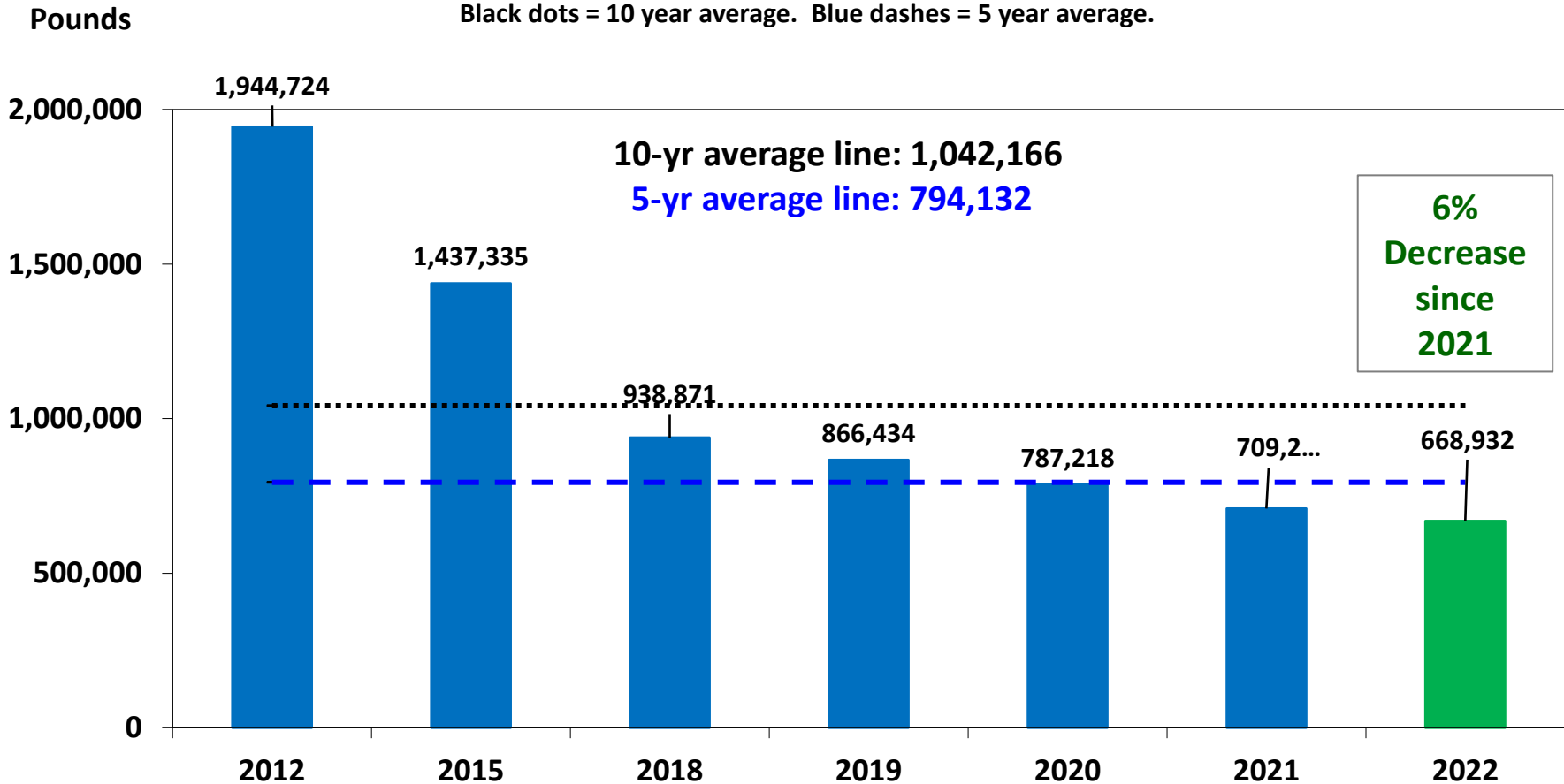
1995→2022: 45% Reduction in CO Emissions

Biggest change since 2021 was decrease at Chevron Pasadena Refinery:
Sustainable: Decrease primarily from reduced FCC and SRU operating hours/rates.

Total Suspended Particulates (TSP)

2012, 2015, 2018-2022 TCEQ Air Emissions Inventory

Black dots = 10 year average. Blue dashes = 5 year average.



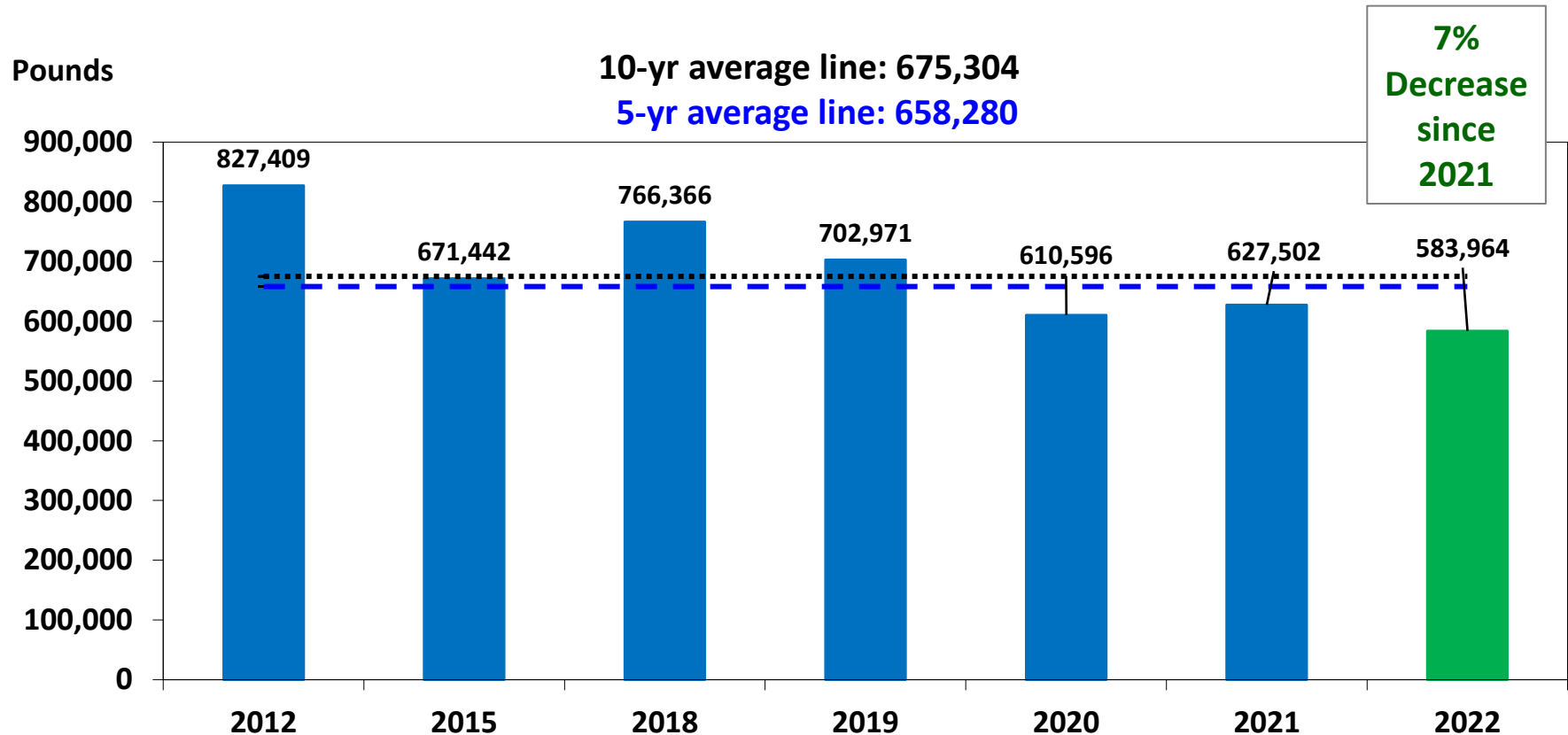
2012→2022 : 66% Reduction in TSP Emissions

Biggest change since 2021 was decrease at Chevron Pasadena Refinery:
Sustainable: Decrease primarily from reduced FCC operating hours/rates.

Total Suspended Particulates Reported as PM 2.5

2012, 2015, 2018-2022 TCEQ Air Emissions Inventory

Black dots = 10 year average. Blue dashes = 5 year average.



2012→2022: 29% Reduction in PM 2.5 Emissions

Biggest change since 2021 was decrease Chevron Pasadena Refinery:
Sustainable: Decrease primarily from reduced FCC operating hours/rates.

Questions?

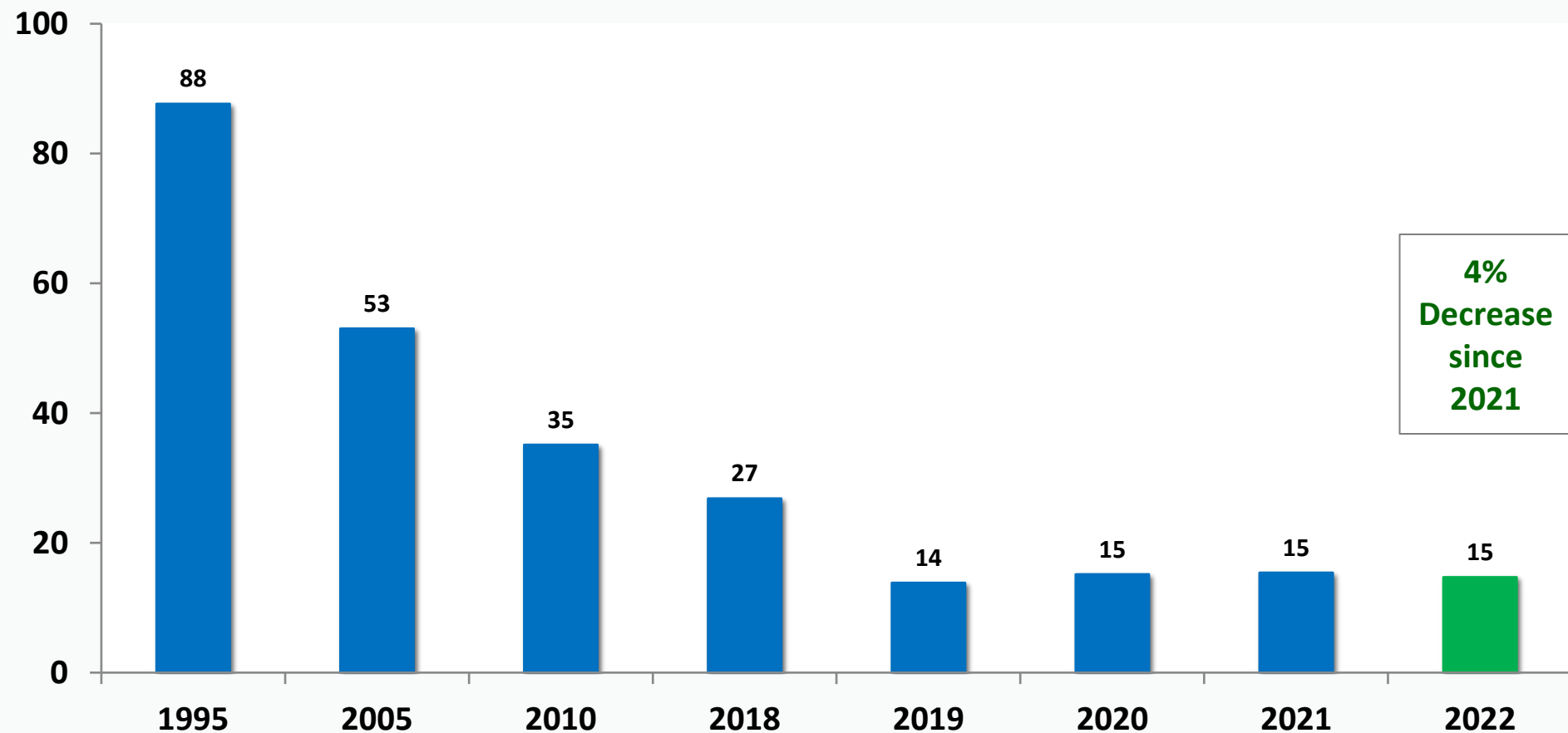
EPA Toxics Release Inventory (TRI) Trends for PCAC Plants

Change in PCAC Plants EPA Toxics Release Inventory

	2018-2022	2021-2022
Total PCAC TRI Releases to air	- 55%	- 7%
From fugitive sources	- 18%	- 22%
From point sources	- 64%	+ 4%

Pounds EPA TRI per Million Pounds of Product 1995, 2005, 2010, 2018-2022

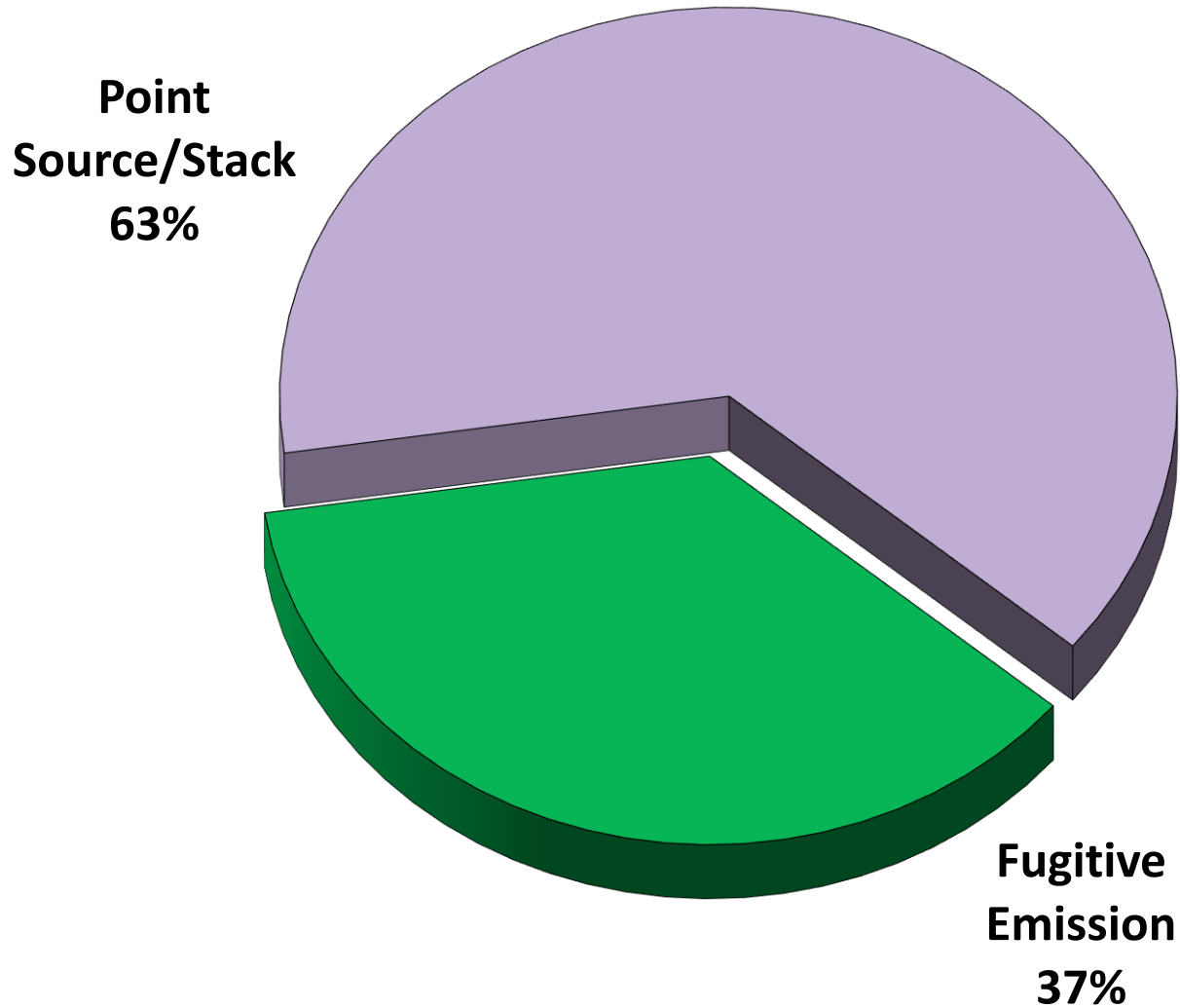
Pounds



1995→2022: 83% Reduction in Pounds of TRI Releases per Million Pounds of Product

Since 1995, PCAC plants have produced 46-57 billion pounds of product each year.

2022 EPA TRI Releases by Source



EPA TRI Total Air Releases

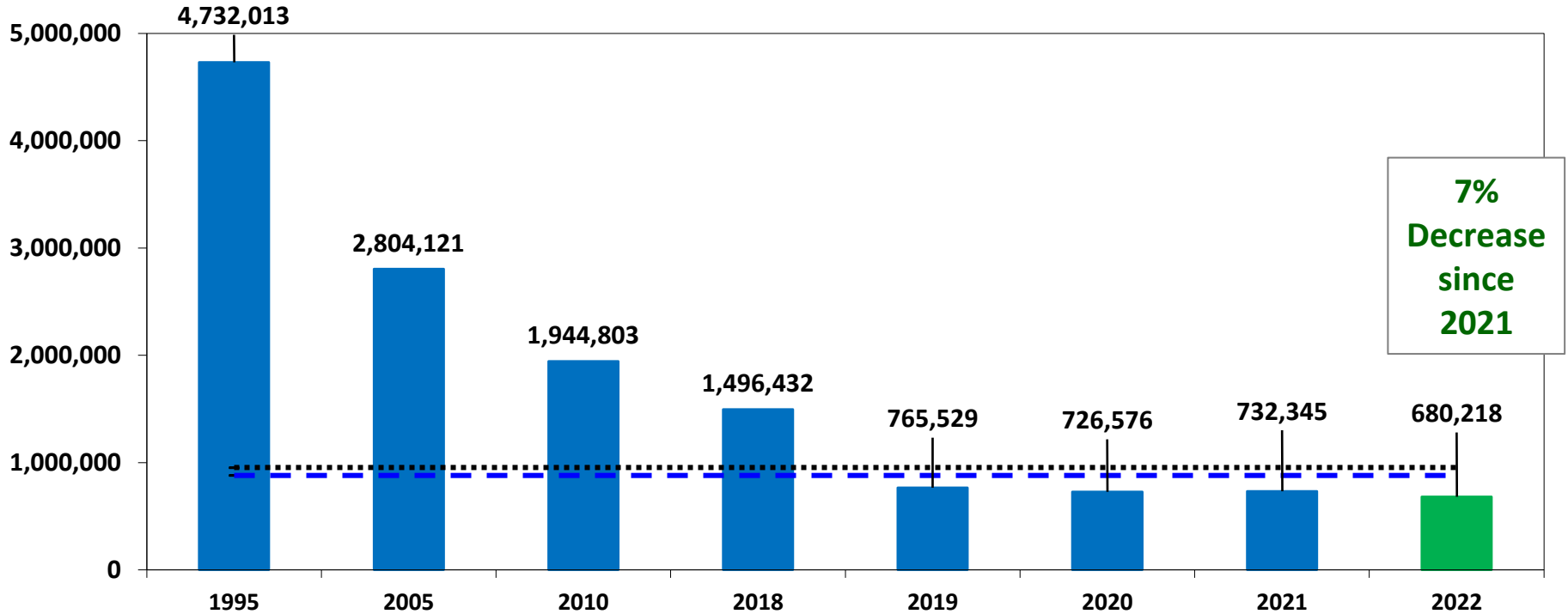
1995, 2005, 2010, 2018-2022

Black dots = 10 year average. Blue dashes = 5 year average.

Pounds

10-yr average line: 953,747

5-yr average line: 880,220



1995→2022 : 86% Reduction in TRI Total Air Releases

Biggest change since 2021 was decrease at Sekisui:

Sustainable: Fewer RQ fugitive emissions due to fewer power outages.

2022 at a Glance by Pollutant

DECREASES

EI VOCs	-9%
- HRVOCs part	-6%
EI SO _x	-43%
EI CO	-4%
EI TSP	-6%
- PM 2.5 part	-7%
TRI Air Total	-7%
- Fugitive part	-22%

INCREASES

NO _x	+3%
TRI	
- Point source part	+4%

2022 at a Glance by Cause

DECREASES

- Routine Permitted Emissions -9%
- Maintenance Emissions -52%
- Upset Emissions - 53%

INCREASES

Are 5-yr Higher or Lower Than 10-yr Averages?

5-YR HIGHER

- NO_x +0.3%
- CO +3%

5-YR LOWER

- All VOCs -9%
- HRVOCs -16%
- SO_x -21%
- TSP -24%
- PM 2.5 -3%
- TRI Total Air -8%

Comparison With Other CACs 2010 – 2021

	BAYCAP (25 plants)	Deer Park CAC (16 plants)	La Porte CAC (43 Plants)	Pasadena CAC (18 plants)
TRI Air	- 38%	- 32%	- 25%	- 64%
NOx	-9%	- 26%	- 9%	- 14%
VOCs	- 33%	- 40%	-5%	- 21%

2021 Texas and Harris County Comparisons

	Number of Facilities reporting EI in 2021	VOCs	NOx
Texas	1858	170,000,000 lbs.	436,000,000 lbs.
Harris County	271	31,000,000 lbs.	33,000,000 lbs.
PCAC	15	5,300,213 lbs.	2,494,458 lbs.

PCAC portion of Emissions Inventory

	VOCs	NOx
Texas	3%	0.6%
Harris County	17%	8%

Questions?